

EXHIBIT B-3

Buckman Direct Diversion Owner's Consulting Engineer Agreement Scope of Work for Conceptual Design of Design Build Process (Phase A)

Introduction

The Owner's Consultant's (OC's) detailed scope of work has been divided into four phases to mirror the approach outlined by the Owner's RFP. The first phase of work, "Phase A: Conceptual Design of the Design Building (DB) Process" is expected to last one year. The tasks included in this first phase scope of work are shown in the following table.

First Phase Scope of Work Overview

Scope of Services Tasks

Phase A: Conceptual Design of DB Process

Basic Services

- Task A1 – Identify Owner's Objectives and Performance Measures
- Task A2 – Develop Project Delivery Strategy
- Task A3 – Finalize Risk Management Strategy
- Task A4 – Develop Plan for Permits and Easements
- Task A5 – Prepare Project Schedule
- Task A6 – Prepare QA/QC Program
- Task A7 – Prepare Procurement Plan and Project Manual
- Task A8 – Project Communications
- Task A9 – Community Outreach Planning
- Task A10 – Conduct Treatment Studies for Preliminary Design
 - Subtask A10.1 – Project Development Requirements
 - Subtask A10.2 – Pilot Testing

Additional Services

- Task AA1 – Legislative and Funding Assistance
- Task AA2 – Bonding Support
- Task AA3 – Transmission and Distribution System Modeling
- Task AA4 – Conduct Tests and Investigations of Site Conditions
- Task AA5 – Additional Services Requested by Owner

Though not included in this scope of work, the second phase of work includes the following, contingent upon successful negotiations and City Council approval of a subsequent and separate professional services agreement:

- Phase B: Procurement Documents for the DB Process (including Preliminary Engineering and Operations Staffing)
- Phase C: Procurement Process for the DB Contractor
- Phase D: Implementation of DB Contract

It is anticipated that the initial tasks under Phases B and C can be started after Tasks A1, A2 and A3 have been completed, along with those portions of other Phase A tasks necessary to determine implementation strategies pertinent to the OC’s subsequent scopes-of-work, resulting in an overlap between Phases A and B to efficiently execute the project schedule.

In general, the deliverables made to the Owner, such as meeting minutes, technical memoranda and reports, will be provided as 10 hard copies and an electronic PDF file on the Project eRoom as described in Task A8. In addition, OC deliverables will be e-mailed to the Owner except for those items that can not be transmitted due to file size limitations.

Basic Services

Task A1 – Identify Owner’s Objectives and Performance Measures Objectives

Develop a detailed set of Project Delivery Objectives and Performance Measures to provide guidance to the Owner, Owner’s Consultant (OC), and DB Contractor throughout all phases of Project implementation. In addition, the Owner’s objectives set forth in its RFP for OC services will be reviewed and the project scope (including components and interfaces) will be defined and assumptions included where necessary. OC will also provide input for environmental coordination for the Project so environmental objectives and performance measures can be considered.

Approach

Project Delivery Objectives will build upon those objectives outlined in the Owner’s Step One and Step Two Request for Proposals (RFP) for the Owner’s Consultant, the DB White Paper submitted to City Council and on the OC’s existing knowledge of the Owner’s goals and vision for this Project. Project Delivery Objectives will highlight the themes of quality, time, cost, and risk and, when finalized and prioritized by Owner upon completion by the OC of this task, will be used as the primary basis for setting requirements in the procurement of a DB in Phases B and C. OC will provide the Owner with the OC’s understanding of the Owner’s Project Delivery Objectives by expanding on objectives in the RFP pertaining to the long-term operation and maintenance (O&M) of the Project, such as life-cycle costs, ease of operation, staffing levels, maintenance requirements, energy consumption, and the like. Such O&M objectives will be based upon interviews of O&M personnel identified by the Owner for the OC to contact.

To most effectively apply the Project Delivery Objectives toward successful Project Delivery, OC will develop a complete set of quantitative or qualitative Performance Measures (such as the return of review comments on DB design submittals within 10 days) for each major objective. The Performance Measures will be used to periodically assess Project performance throughout the course of Project development and delivery.

OC will provide the Owner with the OC’s understanding of the Owner’s Project Delivery Objectives, recommendations of the OC for additions or changes to these Objectives for the Owner’s consideration, and recommended Performance Measures in advance of the Project Delivery Objectives Workshop. The workshop will include an OC facilitated discussion of:

- Owner expectations and vision for the scope, delivery, implementation, and end results of the Project

- Roles and responsibilities of the Owner and OC team members
- Communications protocol within the Owner/OC team, other key agencies and permitting authorities, interest groups, the public at large, and the media
- OC’s understanding of the Owner’s Project Delivery Objectives (including Owner’s priority ranking or relative weights of such objectives) and recommended Performance Measures

A key output of the Owner’s Objectives Workshop is the Owner’s final determination of its Project Delivery Objectives and, most importantly, the Owner’s relative priority of these objectives. As for the Performance Measures, the OC will explain its recommendations to the Owner, such that the Owner understands the reasons for the recommendations and can accept the recommendations. The OC will provide feed back to the Owner by documenting the conclusions reached by the Owner at the Project Delivery Objectives Workshop regarding Project Delivery Objectives and will adjust such Project Delivery Objectives, as necessary, to reflect Owner comments on such memorandum.

The resulting Project Delivery Objectives and Performance Measures will be documented in the Project Manual (Task A7) and will be used as critical inputs to the development of a Project Delivery Strategy as discussed in more detail under Task A2. These objectives and performance measurements will also be used to develop DB procurement documents, including the detailed evaluation criteria to be applied in Phase C when proposals are submitted by the pre-qualified DB contractors.

Depending on the details of the Project Delivery Strategy and associated procurement documents, the Performance Measures may be incorporated into DB requirements and will be used directly or indirectly as the basis for DB performance-based incentives.

The scope of the Project, including interfaces with other facilities, will be defined in the Project Delivery Objectives so that it is clear as to the elements of the Project. Where there may be uncertainty as to certain aspects of the Project elements, assumptions will be proposed by the OC and reviewed and approved or modified by the Owner.

Assumptions

- One full-day workshop will be held with Owner representatives in Santa Fe and will include three key senior OC team members
- Performance Delivery Objectives and Performance Measures will be formalized and finalized based on feedback received in the workshop
- OC will frequently assess and report under Task A8 how well the objectives are being met and integrated into the conduct of other tasks throughout the performance of its duties using the Performance Measures established in this task
- OC will interview one group of Owner O&M personnel to expand upon the O&M objectives for the Project

Deliverables

- Draft list of Project Delivery Objectives and Performance Measures, including the Owners’ detailed objectives, needs, constraints, preferences, requirements, and criteria that were identified in connection with the project delivery objectives
- Agenda for the Owner’s Objectives Workshop, submitted electronically in advance of workshop
- Workshop presentation materials
- Written workshop summary
- Final memorandum addressing the Owners’ detailed objectives, needs, constraints, preferences, requirements, and criteria that were identified in connection with the project delivery objectives, and documenting the Owner’s final sets of Project Delivery Objectives and Performance Measures, to be submitted electronically and incorporated into the Project Manual (Task A7) and the QA/QC Program (Task A6)

Task A2 – Develop Project Delivery Strategy

Objectives

The objectives of this task are four-fold: (1) to identify the alternatives available to the Owner under the DB approach for project delivery, (2) to carefully analyze the trade-offs and the advantages/disadvantages of the Project Delivery alternatives, (3) to identify Operations and Maintenance (O&M) alternatives to be included as part of the DB delivery, and (4) to consolidate the above information into a comprehensive delivery strategy for the Project. The Owners’ detailed objectives, needs, constraints, preferences, requirements, and criteria documented under Task A1 will serve as the foundation for the development of the Project Delivery Alternatives, the analyses of the alternatives, and the OC’s recommended Project Delivery Strategy. This Task A2 will also outline the respective roles and responsibilities of the Owner, OC, and DB Contractor in delivery of the Project.

OC will also provide input into Task A2 based on environmental impacts and issues so they are considered as part of the project delivery strategy.

Approach

While a series of decisions will need to be made throughout the course of the Project, the focus of Task A2 will be on “strategic” decisions of the Owner that are key to the OC’s creation of the DB process and a detailed DB process implementation plan. The OC’s role in the Owner’s decision-making process is to analyze alternatives, make recommendations, advise the Owner’s decision-makers, and consolidate the results into an overarching Project delivery strategy. This process will guide the overall delivery and procurement process and will have a long-term impact on the ultimate success of this important Project.

Task A2 will be performed in parallel with Task A3, Finalize Risk Management, so that strategic decisions are made to meet specific criteria and to reflect risk management considerations.

OC will develop technical, legal, and financial information to assist the Owner in making (as a minimum) these strategic decisions.

The following subtasks will be performed by the OC under Task A2.

Subtask A2.1 – Evaluate Alternatives for Project Delivery

OC will identify and evaluate the following project delivery alternatives in sufficient detail to provide the Owner with a full understanding of the basis for the OC’s recommended Project Delivery Strategy. A preliminary list of project delivery alternatives is shown below (but this list is subject to modification by the OC to reflect the Owner’s final Project Delivery Objectives and priorities resulting from Task A1):

1. **Extent of the Preliminary Design to be Performed by OC** - Alternative approaches that address the extent of preliminary design to be performed by the OC will be considered and will included:
 - a. Technical Requirements and Constraints – a performance-based approach, prepared by the OC, will identify the requirements necessary for design and implementation of facilities allowing innovation within a detailed “envelope” of constraints
 - b. Preliminary Design a detailed preliminary design (up to 30 percent level of design) limiting the treatment facilities to one set of treatment processes

In addition, a combination of technical requirements and constraints could be used for some project elements with differing degrees of preliminary design for the balance of the project elements. Therefore, this task also will include evaluation of alternatives and OC’s recommendations regarding the extent of preliminary design to be used on each of the major Project elements that OC recommends not solely be addressed by technical and performance requirements.

Major Project elements include: Diversion Intake, Sediment Separation and Disposal, Raw Water Transmission, Water Treatment Plant, Residuals Processing and Disposal, and Treated Water Storage, Transmission and interconnections with the existing water distribution system.

2. **Archaeology Data Recovery to be Performed by OC or DB Contractor** - Mitigation of potential impacts to known archaeology resources is the critical path for environmental compliance. There are several significant archaeology sites that cannot be avoided by the Project and prior to ground disturbing activities on these sites, potential impacts must be mitigated. For a project this size, the archaeology mitigation process can take 6 to 9 months.

For this project, specific requirements for the treatment of the archaeological and other potential cultural resources will be outlined in the Programmatic Agreement (PA) which will be described in Phase B tasks. Though the PA will not be developed during Phase A, it is anticipated that the PA will call for a typical Section 106 compliance process for the known archaeology sites. A typical process is:

- Completion of a data recovery (excavation) plan
- Agency negotiations to reach concurrence with the plan
- Archaeology excavation permitting
- Archaeology excavations

- Preliminary Report

“Clearance” to proceed with ground disturbing activities is obtained when the Preliminary Report is accepted. A final and complete report of excavations, analysis, and conclusions is usually not finished for several months to a year after excavation is complete – but the final reporting does not affect the rest of the project schedule.

Two alternative approaches will be evaluated by the OC and a recommended approach will be presented by the OC at the first workshop.

Alternative 1. Complete Archaeology Excavations during Phases B and C. With this approach, the OC will begin impact mitigation for known archaeology sites as soon as possible in Phase B. With agreement by the land managing agencies, sites can be excavated and archaeology clearance obtained prior to issuing a DB contract. The process should start after the OC has explored all options for avoiding sites. RFP documents for DB proposers will show the areas that are clear for Project use.

Besides averting potential time impacts, this approach allows the Owner to provide more complete and accurate information to the DB proposers. The DB proposers should then be able to more accurately bid the project without taking on the risk of an environmental process that is (to them) full of unknowns and will result in a higher bid. This approach is likely to ultimately result in cost savings to the Owner, although the OC will evaluate the trade-off between the potential for such savings versus the additional cost to the Owner during Phases B and C. The OC will also take into account known and potential impacts on project schedule.

Alternative 2. Include Archaeology Excavations as a Specification of the DB contract. The other approach is to include archaeological “clearance” and permitting in the DB specifications. The DB firm would then have to deal with the risk of beginning a DB project without complete environmental clearance for the Project right-of-way (ROW). Additional costs for this work and additional contingencies for this risk would be included in DB bids.

The DB schedule will include time for archaeology clearance at the significant sites prior to ground disturbing activities at those locations. Construction can proceed at other areas concurrent with archaeology excavation. Although conducting archaeology on part of the project area at the beginning does not necessarily extend the overall DB schedule, archaeology would most likely be on a critical path for successful project completion.

The OC will evaluate the relative cost, schedule, and risk trade-offs to the Owner associated with these two alternative approaches to the importance question of archaeological recovery and will present a recommended course of action for this strategic issue.

3. DB Contract Format - There are three basic approaches to how the Owner will compensate the DB’s design and construction costs and profit margin. These approaches include:

- a. **Lump Sum Price** (with or without allowances for certain items) under a fixed price DB contract
- b. **Guaranteed Maximum Price** (with or without shared savings) under a Construction Management At-Risk contract
- c. Combination Lump Sum and Unit Pricing under a DB contract

The OC will analyze the trade-offs associated with each of these approaches in light of the Owner’s Project Delivery Objectives and develop a recommended DB contract compensation and format approach.

4. DBs Pre-Qualification Requirements - Several approaches can be taken to make sure that the potential DBs invited to submit detailed technical and price proposals in Step Two of the procurement process have sufficient capabilities to successfully deliver the Project for the Owner. These approaches include:

- Strict minimum “pass or fail” criteria for relevant Project experience and financial condition
- Comparative evaluation criteria with targeted or maximum number of short listed firms
- Combination of the above

The OC will prepare recommendations on DB Contractor pre-qualification requirements for the Owner’s consideration.

5. Procurement Techniques for the Development of Technical Proposals (Step Two) -

Alternative procurement techniques for the development of Step Two RFPs will be evaluated by the OC and recommendations developed (a part from the question of the extent of preliminary design to be prepared by the OC) for the Owner’s consideration. These techniques will help ensure that the technical proposals developed by the potential DBs during Step Two of the procurement process are responsive to the Owner’s Project Objectives and may include the following:

- Confidential and technical review meetings with potential DBs
- Submission of technical proposals before final pricing
- Circulation of draft Step Two Request for Proposals for comments from potential DBs
- Careful development of Owner’s evaluation criteria to reflect Owner’s Project Objectives
- Evaluation of Step Two proposals prior to opening costs
- Allowable deviation by DB from Preliminary Design

6. Extent and Duration of DB’s O&M Responsibilities - A number of alternatives can be envisioned and include:

- DB commissioning and Owner O&M
- Full-service O&M for one year with renewal at the Owner’s election
- Full-service O&M for an extended period (3-10 years) with or without a renewal option
- Extended performance testing
- Management and training of Owner O&M staff
- O&M support services by DB
- Contract management by Owner’s Consultant

The OC will prepare recommendations on the extent and duration of DB’s O&M responsibilities upon completion of design and construction of the Project, based upon the OC’s evaluation of the

above and possibly other alternatives and based upon the OC’s discussions with Owner’s O&M personnel.

OC will meet with the Owner during two workshops to discuss the OC’s recommendations on these and other strategic issues and how they relate to the Owner’s Project Objectives developed in Task A1. The first workshop will be organized to include all of the strategic issues but not all of the strategic issues will be finalized at the first workshop. The second workshop, held after the Risk Management Workshop under Task A3, will finalize the strategic issues remaining from the first workshop. Such issues that will not be finalized until the second Project Delivery Strategy workshop will include ones that are dependent on the outcome of the Risk Management workshop (e.g., degree of preliminary design and DB’s O&M responsibilities are very much tied to the risk management strategy, whereas pre-qualification requirements and procurement techniques can be finalized apart from the risk management strategy. In either case, the results of Task A1 will be utilized by the OC to refine the strategic issues and alternatives and the exact organization of the two workshops in Task A2.

Subtask A2.2 – Prepare Decision Matrices for Recommended Strategic Issues

OC will prepare a decision matrix to support its recommendations for each strategic issue. Each matrix will array the decision alternatives considered by the OC against the applicable decision criteria and factors that relate to the Project Delivery Objectives finalized in Task A1. In many instances, it can be expected that criteria will need to be balanced against one another and that subjective descriptions (such as advantages and disadvantages) will be utilized. Where appropriate, however, objective measures will be applied to the criteria and factors. These decision matrices will be prepared by the OC and submitted to Owner before the workshops.

Subtask A.2.3 – Finalize Project Delivery Strategy

After the Risk Management Workshop (described in Task A3), a second workshop on the Project Delivery Strategy will be held between the Owner and OC to review the OC decision matrix, and discuss OC’s recommendations for the strategic issues not finalized in the first Project Delivery Strategy workshop and to discuss OC recommendations outlining the respective roles and responsibilities of the Owner, OC, and DB Contactor in delivery of the Project.

Assumptions

- Two workshops to be held in Santa Fe

Deliverables

- Decisions and key alternatives memorandum including descriptions of the decision, OC’s recommendations regarding each and the reasons why, and the implications for the Project
- Project Delivery Strategy Workshop 1 agenda, presentation materials and minutes
- Decision matrix with criteria, factors and advantages/disadvantages according to Owner objectives. OC’s recommended decisions will be highlighted
- Project Delivery Strategy Workshop 2 agenda, presentation materials and minutes

- Decision memorandum documenting the Owner’s acceptance of OC’s recommendations or any deviations therefrom and the associated reasons.

Task A3 – Finalize Risk Management Strategy

Objective

Develop a Risk Management Strategy for the Project that will serve as the foundation of the procurement process in the early stages of the Project schedule. Early identification of the Project risks will also permit additional time to complete investigations that may reduce or eliminate some significant risks and will provide maximum opportunity to meet the Owner’s objective to transfer performance risks associated with delivery of the Project.

Risk allocation recommendations made by the OC under this task will be developed in parallel with the Project Delivery Strategy developed by the OC in Task A2. It is recognized that this early task on risk management is intended to establish an overall approach or strategy for risk management, and as project delivery advances to Phases B and C, additional issues and specific details pertaining to risk management will need to be addressed in those phases. For example, the position of the pre-qualified DB contractors invited to submit proposals will need to be taken into account.

OC will also provide input on environmental impacts and issues so that they are considered as part of the overall risk management strategy.

Approach

OC’s approach to developing risk allocation and management recommendations for the Owner is two-fold: OC will distinguish those risks that are inherently reduced through DB delivery (such as Owner design liability, construction cost claims due to design changes, schedule of design and construction activities, and input/output performance of treatment processes) versus the risks that may or may not be appropriately reduced through DB (such as subsurface conditions, permit delay and scope impacts, indemnities, environmental issues, uncontrollable circumstances, and subjective performance objectives).

OC’s approach will provide the Owner with the full benefits of the risk reduction inherent in the DB approach while carefully assessing the trade-offs associated with allocation of the risks that do not necessarily follow the DB approach. In this regard, a red flag should be raised whenever a particular risk allocated to the DB puts the contractor in the position of being an insurer without coverage by outside insurance, where the “insurance” requested may generate a significant increase in the DB’s bid, thereby raising the costs unknowingly but dramatically to the Owner.

Subtask A3.1 – Prepare Risk Assessment and Inventory

A preliminary inventory and assessment of Project risks will be prepared by the OC as the first step in its development of risk strategy recommendations. OC will include an identification of each anticipated risk, an assessment of each risk- their consequences and probabilities, and a listing of the means/methods of mitigating, transferring or managing each identified risk. The benefit or “reward” to the Owner of risk mitigation or transfer will then be described, including identifying those parties who can best manage or absorb the risk.

Subtask A.3.2 – Assess Environmental Risk

Environmental compliance issues could create a scheduling bottleneck and may pose risk management difficulties if not handled by the Owner directly, as the permittee, or the Owner’s Consultant, acting as the Owner’s expert due to the Owner’s lack of expertise and staff resources to handle these permitting issues directly. Summary maps and schedules demonstrating the most sensitive environmental locations and timing issues and recommendations for how these may potentially affect the project schedule will be prepared. Examples include cultural resources that may not be avoidable, environmental permit schedules, and raptor or migratory bird survey dates. The environmental requirements and constraints will be developed using the information in the most recent versions of various documents including the EIS, the NEPA Administrative Record in the form of a Biological Opinion or U.S. Fish & Wildlife Act Coordination Report, Final Cultural Resource Report and New Mexico State Historic Preservation Officer (SHPO) concurrence. Draft and final Assessment of Environmental Risk report with graphics, maps and schedule of significant environmental activities will be prepared and submitted.

Subtask A3.3 – Develop Insurance and Performance Security Plan

An Insurance and Performance Security Plan will be prepared that reflects the allocation of risks outlined in the final Risk Management Strategy recommended by the OC and adopted by the Owner through the Risk Management Workshop and related activities under Subtask A3.3. This plan will identify the type and extent of insurance and performance guarantees to be provided by all of the Project proponents (Owner, OC, and DB). A technical memorandum will be prepared evaluating the pros/cons and providing OC’s professional and expert recommendations regarding options for Owner provided or required insurance for the major Project risks: general liability, professional liability, builder’s risk, and workmen’s compensation. The Owner will engage the services of an insurance advisory firm with specialized expertise in recommending insurance coverage for major design/build projects. OC will assist Owner in drafting a scope of services for its specialized insurance advisory firm.

A briefing memorandum will also be prepared and will outline the optional forms of performance security that the Owner should consider such as the level and type of bonding, minimum financial strength of the bidders, letters of credit or other performance security instruments. OC will make specific recommendations and the underlying rationale. The relative costs and the financial security offered by each such instrument will be identified and summarized in a final memorandum that will include a recommended Insurance and Performance Security Plan. This memorandum and OC’s recommended Final Risk Management Strategy will provide the Owner with the information needed to accept OC’s recommendations regarding a final Insurance Performance Security Plan for the Project.

Subtask A3.4 – Conduct Risk Management Workshop

A preliminary risk allocation matrix will be prepared that recommends a mitigation, transfer, or management strategy for each identified risk. The environmental risk issues and associated assignment of risk will also be discussed. This comprehensive risk assessment and management plan will then be vetted with the Owner’s cognizant management, legal, operations, and technical staff prior to conducting a facilitated workshop for key Owner decision makers to review the OC’s recommended Risk Management Strategy. OC will brief the key Owner decision-makers and appropriate elected officials regarding its recommended risk management strategy at an early date and will recommend to the Owner that its recommendations be accepted by the Owner. This

Owner-accepted strategy will then be incorporated into the Project Manual and serve as the basis for procurement document preparation to be carried out by the OC in Phase B.

Assumptions

- Workshop to be held in Santa Fe
- Owner will provide coordinated review comments on the various plans and memoranda
- Refinement of the Risk Management Strategy will occur during Phases B and C

Deliverables

- Preliminary Assessment and Inventory of Project Risks technical memorandum
- Draft and Final Assessment of Environmental Risk technical memorandum
- Draft and Final Insurance and Performance Security Plan
- Briefing memorandum on optional forms of performance security
- Recommended Risk Management Strategy
- Risk Management Workshop agenda, materials and minutes

Task A4 – Develop Plan for Permits and Easements

Objective

OC is responsible to identify all existing requirements for all necessary permits, determine construction and operating permitting data requirements, and identify easement owners. OC will identify the time frame necessary to complete each permit, the required permit completion date, and develop OC’s recommendations of the Owner, OC, and DB responsibilities to obtain each permit. Completion of time-sensitive permits advances the goal of managing and enhancing the timely completion of the project.

The OC will also provide overall environmental coordination for this phase of the Project. Services include discussions with the Owner and agencies regarding environmental regulations and their applications, the NEPA process, compliance process and timeframes, sensitive design issues, and agency policies and procedures. OC will meet with the Owner, agencies and other parties to coordinate these issues.

Approach

OC will build upon the previously prepared permit planning documents and compiled permitting forms and information to evaluate the permitting needs. Because some of the permitting requirements have changed since originally planned (i.e., the New Mexico Department of Transportation [NMDOT] revised the ROW permitting requirements), OC will contact each agency to determine schedule and data needs for the permits. The permit plan will draw upon the data presented in the Environmental Risk Report prepared during Task A3 to fully evaluate the implications and risk of assigning permitting responsibility to the DB. Additionally, a preliminary list of necessary operating permits will be identified. The operating permits will be highly dependent upon the final design of the facilities and will likely be assigned as a DB responsibility.

However, the initial list and scheduling requirements will be incorporated in the permit plan for the procurement documents and for schedule purposes.

The data needs for the permit and the ultimate schedule requirements to obtain permits by a specific date will dictate the responsible party (OC or DB). The OC will prepare a permit plan that outlines the Owner, OC, and DB roles and responsibilities and specific information required for each permit application. OC will identify all owners of parcels necessary for waterline easements by consulting Santa Fe County records.

OC will provide early coordination with stakeholder agencies to fully understand regulatory challenges early in the Project, develop and incorporate solutions to identified challenges, and avoid negative impacts to the Project’s schedule. OC anticipates that agencies will include:

- Bureau of Land Management
- U.S. Forest Service
- U.S. Army Corps of Engineers
- Bureau of Reclamation
- U.S. Fish and Wildlife Service
- State Historic Preservation Officer
- New Mexico Department of Transportation
- New Mexico Construction Industries Division
- New Mexico Environmental Department
- Santa Fe County Planning Department
- U. S. Environmental Protection Agency

Issues that will be addressed under this task include coordination of Clean Water Act permit conditions, Threatened and Endangered Species, Historic Resources, NHPA and Section 106 compliance, NPDES discharges, and environmental clearance for DOT (and other) rights of way. Permitting and compliance will require coordination between the Owner, the DB contractor, and the agencies regarding application of the regulatory requirements, construction means and methods, quantified impacts, and planning for unforeseen impacts.

OC will also discuss permitting and compliance requirements with different agencies where a beneficial use for presedimentation solids and/or treatment plant solids can be identified.

Assumptions

- Permit plans will be incorporated into and submitted with the Project Manual
- Phone calls with each agency will be sufficient to gather information on permit requirements in most cases
- A total of up to four meetings will be held with agencies that historically prefer meetings to discuss requirements and obtain initial agency acceptance (e.g., Bureau of Land Management [BLM], the New Mexico Environmental Department [NMED] and the U.S. Forest Service [USFS])

- Expected construction related permits/easements to be evaluated include: EPA sediment return NPDES, NPDES for facility discharges, Office of the State Engineer (OSE) Permit, NMDOT ROW permit, private easements along distribution pipelines, property value assessments, Clean Water Act Section 404 Permits for intake and pipeline arroyo crossings, US Fish and Wildlife/NM Game and Fish approval of diversion design components, BLM/USFS stipulations and ROW permits, wetlands mitigation plan, NMED Drinking Water Bureau System Modification, NMED Water Quality Bureau or EPA for Stormwater General Permit for Construction, NMED Liquid Waste permits, Programmatic Agreement for Section 106 Compliance, Archaeological Data Recovery Plan, Cultural Properties Review Committee Permit (CPRC), Natural Resources Protection Plan, Cultural Resources Protection Plan, State Land Office ROW, utility company coordination, NMED Construction Programs Bureau Construction Permit, and County, City and State (NMCID) Building/Development Permits
- Discussions will be held with authorities at the Santa Fe Solid Waste Management Agency Caja Del Rio Regional Landfill concerning disposal of solids from presedimentation and the treatment plant
- Discussions with up to four other agencies on use or reuse of solids for a beneficial use such as composting
- Potential operating permits and plans that will be evaluated include the following: Risk Management Plan, Process Safety Management Plan, Utility Service Agreements, Stormwater Pollution Prevention Plan, Operator Certification, Emergency Response Plan, and Health and Safety Plans
- One workshop in Santa Fe will be held to discuss the Draft Permit Plan with the Owner
- This task provides services during the first year. Subsequent environmental coordination will be provided under Phases B, C and D.
- Information is available in the Administrative Record and the EIS
- The list of agencies provided is preliminary and other public and private entities may identify themselves later
- Identification of ROWs, easements, and landowners for routing of treated water pipelines is dependent on finalizing pipeline connection points with the City’s and County’s water systems, as discussed in Subtasks 10.1.

Deliverables

- Draft Permit and Easement Plan that outlines the Owner, OC, and DB roles and responsibilities and specific information required for each permit application
- Meeting minutes and/or telephone call report memoranda for all agency communication
- Permitting Plan Workshop agenda, presentation materials and minutes
- Graphics and handouts regarding environmental issues provided for agency meetings

- Final Permit and Easement Plan

Task A5 – Prepare Project Schedule

Objective

Develop critical path project schedule that the OC will use in evaluating impacts of decisions and project changes, and provide updated schedule to assess Project progress.

Approach

OC will work with the Owner, stakeholders, and agencies to identify schedule drivers and constraints (i.e., limits on when work in the river can occur, completion of the bird nest survey, Buckman Road upgrades, water usage and demand patterns, and pipeline construction within Las Campanas Road). OC’s construction staff will assist with the scheduling, including analysis of the typical construction capabilities such as length of pipe in a month, \$/month and earthwork volumes per month that will be utilized to assess task periods. Other milestones and schedule requirements that will be included are permitting, site studies and procurements periods. These will all be incorporated into the Critical Path Method (CPM) Project schedule.

OC will discuss the scheduling software packages (MS Project, SureTrak, Primavera P3, etc.) with the Owner to identify the Owner’s preference of software to be used for the Project Schedule. OC will provide one copy of the software to the Owner for use in the Owner’s electronic receipt and review of the monthly schedule updates.

Assumptions

- The initial schedule will be incorporated into and submitted with the Project Manual
- It is assumed that Primavera Project Planner (P3) CPM scheduling software will be used, the current industry standard
- The Owner’s IT staff will assist with software installation, as needed
- OC will provide basic file operation training needed for the Owner to open and view CPM files without editing them
- Schedule updates (through Phase A) will be submitted electronically and incorporated into the progress reports under Task A8. This task provides eight schedule updates, assuming 3 months to develop and provide the initial schedule. Subsequent schedule updates will be provided under Phases B and C.
- The DB will be responsible for submitting schedule and updates after DB award; however, OC will provide an assessment of the DB’s schedule in Phase D

Deliverables

- One copy of scheduling software and documentation
- Initial CPM schedule
- Monthly CPM schedule updates for 8 months after the initial schedule has been provided

Task A6 – Prepare QA/QC Program

Objectives

The objectives of the QA/QC Program will be two-fold – develop requirements for the DB’s QA/QC Program for project implementation and for the QA/ QC procedures required for implementation by OC to carry out monitoring of the DB’s work. Both of these sets of requirements will be further divided into two parts, QC – the procedures put into place to provide quality, and QA – the control activities that are performed to make sure that the QC process is carried out and quality is obtained. The QA/QC requirements recommended by OC in Phase A will be further refined during Phases B and C.

Approach

Formal requirements for the DB’s QA/QC Program will be developed specifically for this Project. These will include general specification requirements for controlling the quality of the Project, as well as assuring that the controls are carried out. OC will develop the QA/QC Program document that will be further developed in Phase B and used as part of the Step Two RFP as well as the contractual requirements. The program will include specific requirements for the DB’s program including, but not limited to the following:

- Design Phase QA/QC – ensuring DB’s design meets contractual requirements, technical requirements, codes and standards
- Environmental QA/QC – quality control and monitoring of DB’s construction in and around environmental and cultural resources including meeting EIS requirements and ROW stipulations
- Construction QA/QC – quality control, testing, and monitoring of DB’s construction in meeting specified requirements as well as codes and regulations
- Traffic Control and Management Plan QA/QC – quality control and monitoring of the DB’s construction traffic control
- Health and Safety Plan QA/QC – quality control and monitoring of the DB’s construction health and safety plan
- Testing and Startup Plan QA/QC – procedures and monitoring of DB’s factory and field testing, and startup, of all systems and equipment
- O&M Information Plan QA/QC – procedures and monitoring of DB’s O&M information documentation, including as-builts, shop drawings, labeling, and other items for all facilities and equipment
- Operations QA/QC Plan – quality control and monitoring of the DB’s operation of the plant and other facilities to ensure DB is meeting all water quality regulations and other contractual requirements
- Maintenance QA/QC Plan – quality control and monitoring of the DB’s maintenance of the facilities

- O&M Tools QA/QC Plan—procedures to ensure that DB’s Standard Operating Procedures and tools (Computerized Information System and Maintenance Management Program) are developed, implemented, and meet contractual requirements
- O&M Transition QA/QC Plan—procedures for ensuring that the DB’s transition plan is carried out including adequate training of Owner’s staff in the operation and maintenance of the facilities
- Quality Assurance Plan Resource Commitments—roles and responsibilities of individuals for ensuring that quality controls of the various plans are carried out

For each of the above QA/QC Program items to be required of the DB Contractor, the documents to be provided to the Owner by the DB Contractor will be generally identified. Such QA/QC document list will be refined in Phase B.

The QA/QC Program that the OC will follow in monitoring of the DB’s work will be developed based on OC’s standard Quality Management Process (QMP) Manuals that the OC will tailor to the Project. Three OC manuals will be used as a basis for our QA/QC program: QMP1—QA/QC for Planning, Design, and Construction Projects; QMP2—QA/QC for Construction Services; and QMP4—QA/QC for DB Projects.

OC will prepare a general Project Work Plan for carrying out the OC work and with the Owner and DB, which includes the QA/QC Program. This Plan includes communications procedures, roles and responsibilities, checking requirements, and budget assignments. In addition, this Plan will also include QA/QC recommendations for the Owner to carry out its work on the Project, as discussed in the Task A1 workshop. Performance delivery objectives and performance measures developed in Task A1 will be incorporated into OC’s QA/QC Program.

Assumptions

It is assumed that OC will develop the QA/QC Program draft document, that it will be adequate and complete, and that the Owner can accept it with minimal review. The OC will submit 10 copies for review and comment. After receipt of the Owner’s review comments, the final version of the document will be incorporated into the Procurement Plan and Project Manual.

The QA/QC Program documents prepared under this Task A6 are the general requirements to be followed by the DB Contractor in preparation of its QA/QC program and will capture the overall scope and general requirements that will be further developed in Phase B for incorporation into the procurement documents. In general, each QA/QC plan is 3 pages in length.

The level of detail for the QA/QC Program to be carried out by the OC in Phases B, C, and D will be of sufficient detail to enable the Owner and the OC to negotiate and execute the subsequent engineering services agreement with the OC for Phases B, C, and D.

Deliverables

- Draft QA/QC Program
- OC’s Project Work Plan

Task A7 – Prepare Procurement Plan and Project Manual

Objective

OC will prepare a comprehensive plan to deliver the Project and a Project Manual to document that Plan. The Procurement Plan and Project Manual will document the Phase A steps, activities, OC recommendations and Owner acceptance of those recommendations, and the limited Owner decisions as specified in the RFP. Such Owner decisions during Phase A will include but not be limited to (a) the final project delivery objectives, including priorities or relative weights for each objective, (b) the scope of the Project, including assumptions where necessary, (c) the duration of management, operations, and maintenance of the Project by the DB Contractor, (d) the final project delivery strategy to meet the Owner’s project delivery objectives, and (e) the acceptance of (or the directed changes to) the various recommendations of the OC developed under Phase A. The plan shall be sufficient to provide clear guidance for the Owner’s Consultant’s management and execution of the Project through Phases B, C, and D. The plan shall also clearly identify the roles and responsibilities of the Owner in Phases B, C, and D.

The Project Manual will be developed in two volumes: Volume I will be the results of Tasks A1 through A3, and input from other Phase A task not yet completed, so the initial tasks of Phases B and C can begin (preparation of the Step One Request for Proposals and prequalification of DB candidates). Volume II will include the results of the balance of the Phase A tasks.

Approach

Several critical decisions are required to finalize the Project Manual, such as the risk allocation strategy, the level of design detail to be provided to the potential DBs during Step Two, the preferred operations strategy for the initial period, etc. OC will make its professional, expert recommendations to the Owner for each of these decisions. OC will provide the Owner with its professionally developed information and analyses supporting its recommendations such that the Owner can understand and make or accept the critical decisions early in the Project, as outlined in the RFP. The facilitation of early Owner review of the plans and procedures that will constitute the final Project Manual is central to Task A7. The Project Manual will include the following volumes and sections, along with any additional information that is completed during Phase A:

Project Manual Volume I

Owner’s Objectives and Performance Measures

Project Delivery Strategy

Risk Management Strategy

Project Manual Volume II

Permits and Easements Plan

Project Development Requirements

Strategy for Preliminary Design

Environmental/Cultural Resources Plan

Agency Coordination Plan

Community Outreach Program Plan

Communications Plan

Project Schedule

QA/QC Program

OC Work Plan

Procurement Plan

Each of these sections will provide sufficient detail to provide the Owner and OC team members with a clear understanding of the strategy, plan, roles and responsibilities, points of interaction, deliverables, and the schedule for implementing the Project.

Outline Conceptual Project Manual

A work flow diagram and narrative outline for each of the plans, listed above, will be prepared after the Task A1 Owner’s Project Objectives Workshop.

These diagrams and outline will describe the individual plans in sufficient detail to demonstrate at a conceptual level how the processes outlined for each stage of the procurement and its execution are designed to meet the Owner’s objectives. The work flow diagrams will identify critical decisions for which OC will provide its recommendations and supporting analysis as well as the coordination required among the planned procurement/execution processes. They will also provide a conceptual view of the entire project delivery process proposed as a solid foundation for the critical early decisions that are essential to rapid Project progress.

Prepare Draft Project Manual

A draft of the Project Manual will be prepared as each of the plans described in Phase A are completed. Volume I will be completed after Tasks A1, A2, A3 and the draft permit plan (Task A4), the initial schedule (Task A5) and necessary QA/QC items (Task A6) are completed. The draft Project Manual will not only describe the policies and processes to be employed to implement the procurement and Project execution, but will also describe the roles, responsibilities and authority of the Owner and OC.

Conduct Finalization Workshop

A workshop will be conducted with the Owner to finalize the Project Manual. This workshop will provide the Owner with an opportunity to review the complete Project delivery plan. The workshop also gives the OC and Owner the chance to flag critical outstanding decisions that are needed early in Phase B to maintain the Project schedule.

Copies of the Draft Project Manual and the Final Project Manual will be distributed and located on the web-based Project eRoom. This will make the Project Manual readily accessible to Project participants. Updates to the Project Manual, reflecting decisions or changes that occur in later phases of the Project, will be distributed via the eRoom.

Assumptions

- Workshop held in Santa Fe
- Manual will be based on previously reviewed and approved plans and strategies

Deliverables

- Work flow sheets and conceptual outlines for the Project Manual
- Draft and Final Project Manual, Volume I and II
- A Project Manual finalization workshop, including agenda and related materials

Task A8 – Project Communications

Objectives

In addition to the meetings and workshops provided as part of the other tasks, OC will make timely delivery of Monthly Project Progress Reports and hold Project Progress Meetings with the Owner. To the extent possible, OC will combine the Project Progress Meetings with other meetings or workshops to minimize the Owner's workload. Also, OC will provide periodic updates to the City's PUC, BDD Board, and make a presentation to the City Council.

Approach

Each month, OC will issue a Monthly Project Progress Report. This Report will include the following items:

- Brief narrative of progress and deliverables made by OC since the last Monthly Project Progress Report
- Anticipated progress over the next period including an updated list of deliverables, meetings and their dates, and other anticipated OC activities
- Updated list of action items and outstanding items and decisions
- A list of concerns and/or potential issues
- An updated CPM Project Schedule

Monthly Project Progress Reports will be electronically distributed within 10 calendar days after the end of the month to provide the Owner with adequate time to review the information. Each Monthly Project Progress Report will be concisely written (e.g., bullets) and will include a one-page executive summary to facilitate the Owner's presentation of the materials to each entity's governing body, at the Owner's discretion. OC will meet with the Owner in a Project Progress Meeting to discuss the items from the Report and to discuss new developments, plans for resolving outstanding action items, and upcoming deliverables and workshops. In addition to the reports and meetings, OC will provide updated PowerPoint slides on the progress of the Project for the Owner's use in communicating Project progress to governing bodies.

OC will provide an initial presentation to both the City's PUC and City Council on the project delivery method and DB procurement approach. Also, OC will provide project updates to the PUC every other month beginning in April 2005 through February 2006. Subsequent updates to PUC will be provided under Phases B, C and D. OC will also provide updates to the BDD Board on a quarterly basis during the April 2005 through March 2006 period. Subsequent updates to the BDD Board will be provided under Phases B, C and D.

OC will setup, manage, and populate a web-based Project eRoom. OC and Owner team members will be provided with the necessary information to download the eRoom software and gain access. The web-based eRoom will permit easy internet access to specific Project information and will allow the Owner to easily and readily select the level of eRoom security (who can access what material). The eRoom will grow as the Project develops to provide a central repository for documents and deliverables, decision records, information for key stakeholders, progress reports, meeting and workshop materials and minutes, photos, and other project files and documents. As

recommended by the OC with concurrence by the Owner, limited access could be provided to DB proposers to access procurement documents, meeting minutes, drawing files for proposal development, and other information. The selected DB will also be an active member of the eRoom and will be provided access to relevant folders and content. The eRoom will provide an easy means of transmitting design and construction submittals and comments by the DB and OC in subsequent phases of the Project.

Also under this task, monthly invoices will be prepared and transmitted to the Owner in an agreed upon format. The Monthly Project Progress Report will accompany the invoice and serve as the description of services and progress for that invoice.

Assumptions

This task provides communications for one year. Subsequent communications activities will be provided under Phases B, C and D.

- Twelve Monthly Project Progress Reports will be prepared and distributed via e-mail and through the Project eRoom.
- Twelve Project Progress Meetings will be held in Santa Fe during the Phase A of the Project.
- Presentation materials for the Owner to use in communicating with governing bodies will be prepared by OC. It is estimated that five slides will be updated/ prepared on a monthly basis including an updated project schedule, photos, and other readily-available Project information.
- One meeting with the City’s PUC and one with City Council to initially discuss project delivery method and DB procurement
- Six presentations to the City’s PUC to provide a progress report on the Project
- OC will attend four quarterly BDD Board meetings
- Owner has access to the internet and will provide its own computers and web browser software to allow use of eRoom software by Owner personnel.
- Twelve invoices with Monthly Project Progress Reports. Additional items past one year will be provided under Phases B, C and D.
- Additional progress meetings with the Owner may be needed but can not be estimated at this time. Therefore these additional meetings will be provided as requested under “Additional Services.”

Deliverables

- Monthly Project Progress Reports
- Project Progress Meeting agenda and materials
- Project Progress Meeting minutes
- Monthly PowerPoint updates for Owner’s presentation to governing bodies

- Monthly Project Invoices
- Presentation materials and minutes for BDD Board meetings, PUC meetings and one City Council meeting
- Web-based Project eRoom, including download and access instructions

Task A9 – Community Outreach Planning

Objective

Ultimately, community outreach will be provided through annual information meetings and fact sheets under Phases B, C and D of the Project. This task provides the necessary planning of the outreach strategy.

Approach

Early in the Project, OC will facilitate a half-day Community Outreach Program workshop with the Owner to discuss mutual and individual Owner community outreach goals and objectives, and key messages to be communicated to the Community throughout the duration of the Project. Based on the outcome and information obtained during the workshop, OC will develop a draft Community Outreach Program Plan for the Owner’s review and concurrence. The Community Outreach Program Plan will describe community outreach goals; core messages; informative materials; Owner, OC, and DB roles and responsibilities; a schedule for public meetings; and other public communications activities.

It is proposed that under Phases B, C and D the OC will then prepare and conduct general public information meetings in support of the Project.

This task includes planning for community outreach. Should it be determined as part of this planning that a meeting with the community is needed under the Phase A services, the OC will be involved in the meeting as an Additional Service. It is anticipated under this task, that the actual community meetings will be held under Phases B, C and D.

As part of the community outreach, the OC anticipates coordination with other interested community agencies to provide project updates and information. If it is determined as part of the planning for community outreach that the OC will make presentations under Phase A to the following agencies: Northern Pueblos (through the Eight Northern Indian Pueblos Council), the Aamodt Group, and the MRC Committee to effectively communicate with these community groups, the OC’s services will be provided as an Additional Service.

Assumptions

- The Owner will identify and provide public meeting facilities and pay any advertising costs at the Owner’s separate expense
- Deliverables will be provided to the Owner in electronic format using standard software applications via e-mail and the Project eRoom unless otherwise noted
- Monthly Project Progress Reports will be submitted by the OC within 10 calendar days after the end of the month.

Deliverables

- Community Outreach Program planning meeting - Agenda and four hour workshop facilitation, workshop meeting minutes
- Draft Community Outreach Program Plan
- Final Community Outreach Program Plan

Task A10 – Conduct Treatment Studies for Preliminary Design

Subtask A10.1 – Project Development Requirements

Objective

Develop clear and concise performance and design requirements (termed the Project Development Requirements) for the DB’s design, construction and initial operation of the BDD Project. Natural and cultural resource protection requirements and constraints will also be developed for the Project under this Subtask. *OC will prepare Project Development Requirements for operability, maintainability, life cycle costs, staffing requirements, and other important project features, through the use of performance and design requirements.*

These project requirements and constraints will be used in the development of the Step Two RFP (for DB Procurement) and in the DB contractual requirements for the implementation of the Project. The objective is that the completion of this task will provide all of the technical performance requirements required for the preparation of the DB RFP in the event that the Owner decides that no Preliminary Design will be performed, pursuant to the approach contained in the OC’s Proposal. These requirements and constraints will be used in the OC’s preparation of a Preliminary Design, to the extent decided under the Strategic Decisions (Task A2) to precede with some level of preliminary design on all or some portion of the project elements.

Approach

OC will prepare the Project Development Requirements covering all aspects of the Project facilities including, but not limited to:

- Summary of water quality information and pilot- and bench-scale testing results for inclusion into the DB procurement documents (provided through the pilot testing Subtask 10.2)
- Civil and site requirements including acoustical limitation and requirements (both operational and during construction), and modifications to Buckman Road and MRC WTP access road.
- Diversion structure and river work requirements.
- The manner in which the OC will develop and apply performance and design requirements in Phases B, C, and D to provide a Project that meets the Owner’s quality and life-cycle cost minimization objectives. These objectives include but are not limited to operability and maintainability of facilities and equipment, equipment quality, life-cycle cost minimization (requirements for capital costs that will reduce operating costs), degree of equipment and process units redundancy, and similar quality attributes that unless they are addressed explicitly in performance requirements will not be an enforceable DB requirement.

- Process and process equipment requirements including, but not limited to the following: water quality regulations, both existing and foreseeable near-term regulations; process design criteria such as flow rates (but not including criteria for specific treatment processes); equipment and treatment train redundancy requirements; quality of equipment; degree of automation; chemical storage and feed system requirements; residuals (solids) handling requirements; blending water quality requirements; and materials requirements or limitations. Also plant hydraulics criteria such as requirements for overflows, no re-pumping within plant, etc. will be covered.
- Structural requirements
- Architectural requirements, including materials and aesthetics, and minimum space requirements, rooms, features, etc. Requirements will also include City, County, State, and federal standards and codes.
- Security systems and features for the plant and other facilities
- Heating, ventilation, and air conditioning (HVAC); plumbing; and fire protection requirements, including design requirements and codes.
- Electrical and instrumentation/control requirements including the level of automation of facilities, standby power, UPS, design requirements and codes, necessary instrumentation for water quality control and monitoring.
- O&M performance requirements and requirements for a computerized O&M Information System and a Facilities Maintenance Management System.
- SCADA and telemetry of new facilities and communication with existing facilities. This will include requirements for SCADA security features.
- Landscaping and revegetation requirements for pipeline alignments and the diversion treatment plant sites, as well as the water treatment plant site.
- Corrosion control requirements for pipelines, equipment and basins.
- Construction and implementation requirements.
- Project documentation to be produced by the DB.
- Data on existing utility locates, agency ROW stipulations, constraints for pipeline alignments, and other known permitting constraints.
- Criteria and methodology for preparing life cycle costs
- All other technical aspects of the Project for which performance specifications are required or for which general design requirements are required.

The design and performance requirements developed as part of the Project Development Requirements will provide a basis for the technical requirements in the DB procurement and

contract documents. In addition, should it be determined that a preliminary design is to be prepared by the OC, the Project Development Requirements will serve as a basis for this work.

The performance and design requirements are defined as:

“Performance Requirements” – includes items such as finished water quality standards and raw water quality parameters; level of automation; and peak and average flow capacities. These are requirements on how the project elements (such as the booster stations and treatment plant) are to perform once placed in operation and will be mostly objective in nature.

“Design Requirements” – includes standards and requirements the DB’s design (or the OC’s Preliminary Design) must meet. These requirements will reflect preferences of the Owner in some areas and minimum requirements in other areas. Examples would include the number of pumps at a booster station, redundancy of equipment (duty plus standby equipment), and codes that are to be used in the design (such as ACI-350). These requirements do not include process design criteria, such as filter loading rates, chemical doses, etc., nor do these requirements include any level of preliminary design or any plans or specifications. Such design items will be determined and provided either in the DB’s design based on performance and design requirements developed under this Task A10 or in the OC’s Preliminary Design prepared in Phase B and subsequently by the DB based on the requirements and the OC’s Preliminary Design. These requirements do not include requirements and constraints on individual process units (such as filters, UV system, etc.) since the process treatment will not have been developed under Phase A.

The OC will prepare draft memoranda with recommended requirements on the above items and submit them to the Owner, prior to OC lead workshops with the Owner and any specific stakeholders appropriate to the topic. OC will prepare workshop handouts, presentation materials, and meeting minutes. At each of the workshops, OC will provide a forum for discussion and additional input into the design requirements and performance requirements to meet the objectives developed in Task A1. At the workshops, OC will provide direct feedback on the ramifications of Owner input and “needs” on the schedule, cost, quality and associated risk.

As appropriate, individual stakeholders can be invited to workshops to provide input and to promote a sense of “ownership” in the Project. For example, NMED could be invited to workshops on the treatment plant process requirements. Following each workshop, OC will develop a final technical memorandum with detailed design and performance requirements.

The draft technical memoranda will be sent to the Owner for review and comment prior to the workshops. To involve specific stakeholders in the process, they should also receive a draft technical memorandum. Any comments from the stakeholders will be forwarded to the Owner prior to incorporation into the final version of the technical memorandum. Should OC have concerns with any of the Owner and/or Agency comments, or if comments require further exchange of information, the item will be discussed at another meeting prior to finalizing the technical memorandum. Where possible, topics will be combined within workshops to minimize the Owner’s workload.

As part of subtask A10.1, OC and its subconsultant, will conduct a radio path analysis at the Diversion site and of the MRC WTP sites. Recommendations will be provided based on the results of the analysis and our knowledge of the existing telemetry and SCADA system.

Also as part of this task, an Interconnection Plan will be developed to provide the constraints and requirements in connecting to existing facilities, including, but not limited to: electrical facilities, SCADA and telemetry systems, including points of connection with the Las Campanas water system such as the booster station 2A, City and County potable water systems, and the Buckman well system.

Since the exact location of interconnections between the finished water piping and the City’s and County’s distribution systems has not been determined, OC will perform an assessment of the existing information and transmission and distribution system model to ascertain the need for developing new information, evaluations and/or system modeling. Any additional modeling and/or preparation of information and evaluations will be conducted under OC’s Additional Services after the Owner has provided a written notice to proceed. Therefore, some information in the Interconnection Plan, and other items within this task, may need to be completed after the additional modeling is performed and evaluated by the OC.

Under Subtask A10.1, OC and its subconsultant, will develop information on environmental requirements and constraints for the Project, develop a draft memorandum, hold a workshop and prepare a final technical memorandum outlining the environmental requirements/constraints. Responsibilities will be assigned to the OC, the Owner, and the DB for each of the environmental requirements to result in full compliance with regulatory and EIS requirements.

The Project Development Requirements will be a compilation of the above mentioned technical memoranda, and the Interconnection Plan, with an executive summary. This, and other documents, will then be used in the procurement of the DB and in the development of contractual requirements between the DB and the Owner. If it is determined that a preliminary design is to be prepared by the OC, the Project Development Requirements will be used as a basis for its development.

Assumptions

- Four individual all-day workshops will be held to discuss the OC’s recommendations on the following topics:
 - Civil site, roadways, landscaping and site restoration work
 - Near river facilities, including the diversion structure, sedimentation and pumping
 - Pipeline and booster stations including ROW and utility discussions, architecture for booster stations, etc.
 - The manner in which the OC will develop and apply performance and design requirements in Phases B, C, and D to provide a Project that meets the Owner’s quality and life-cycle cost minimization objectives. These objectives include but are not limited to operability and maintainability of facilities and equipment, equipment quality, life-cycle cost minimization (requirements for capital costs that will reduce operating costs), degree of equipment and process units redundancy, and similar quality attributes
 - Treatment plant features, facilities’ operations and maintenance requirements and performance requirements. Including discussion of plant layout and architecture.

- Plant administrative building and site master plan for possible future expansion of the administration and utility crew's Water Utility Building and material storage area.
- Electrical, instrumentation, control and automation, telemetry and SCADA requirements
- Construction and implementation requirements including natural and cultural resources requirements
- Interconnection Plan for connection of finished water transmission lines to the existing potable water transmission/distribution system.
- All other systems (electrical, SCADA, etc.) that need to be connected with existing systems.
- Project environmental requirements and constraints
- Draft and final versions of each technical memoranda will be prepared and the final version of the memorandum will be presented in the Project Development Requirements Report
- Permitting requirements will be provided under other tasks
- No additional radio path analysis will be needed for the new booster stations
- Information needed to develop the natural and cultural requirements and constraints will be obtained from NEPA documents and existing regulations, and will be developed from the most recent available version of the Project's EIS
- Development of the natural and cultural requirements and constraints does not include obtaining permits or SHPO concurrence
- As part of the workshop and discussions, the Owner will provide information and existing modeling for OC's determination of the locations of distribution system connections with the treated water systems, including OC's determination or specification of the DB's determination of necessary hydraulic information for design of interconnections.

Deliverables

- Workshop presentation and handout materials including an agenda for each session
- Minutes from the workshop session used to develop and review the technical memoranda
- Draft technical memoranda:
 - Civil site, roadways, landscaping and site restoration work
 - Near river facilities, including the diversion structure, sedimentation and pumping
 - Pipeline and booster stations including ROW and utility discussions, architecture for booster stations, etc.

- Treatment plant features, facilities’ operations and maintenance requirements and performance requirements. Including discussion of plant layout and architecture.
- Plant administrative building and site master plan for possible future expansion of the administration and utility crew’s Water Utility Building and material storage area.
- Electrical, instrumentation, telemetry and SCADA requirements including SCADA security features
- Construction and implementation requirements including natural and cultural resources requirements
- Interconnection Plan for all systems (piping, electrical, SCADA, etc.) that need to be connected with existing systems or facilities
- Project environmental requirements and constraints
- Response to Owner’s comments on the draft technical memoranda
- Project Development Requirements Report which will include the final technical memoranda
- The Project Development Requirements Report will include, at a minimum, the following figures. The actual project features, such as the pipeline, treatment basins, etc. will be developed under the BD’s design or the OC’s Preliminary Design.
 - Rio Grande diversion structure site drawing
 - Raw water sedimentation facility site drawing
 - Raw water pipeline and booster station alignment and site drawings
 - MRC WTP site drawing
 - Treated water pipeline alignment drawings (to Booster Station 3 and the City/County treated water distribution pipelines)
 - Buckman Road and MRC WTP access road alignment drawings
 - Main Distribution – Single Line Diagrams
 - Control System – Block Diagrams

Subtask A10.2 – Pilot Testing

Objective

The overall goal of this study is to develop water treatment criteria, benchmarks and data for the selection of a treatment process that will effectively treat the water from the Rio Grande with the anticipated wide variety of water quality characteristics. The criteria, benchmarks and data will be used in the DB’s design, and the OC’s preliminary design if provided under Phase B, of the MRC WTP. This task builds upon previously-completed bench-scale testing and collects pilot-scale operational data for use in design of the MRC WTP. Additional bench-scale data will be collected by various equipment manufacturers for determining design and operating characteristics of alternative technologies. The testing program will be conducted to evaluate the effectiveness of a variety of treatment technologies

based meeting USEPA and NMED requirements and current and near-term anticipated regulations for the proposed MRC WTP.

This scope of work for pilot testing has been developed by the OC with the Owner and provides the necessary level of water quality testing and analysis for the development of criteria that may either be used in the OC's preliminary design and/or the DB's design of the treatment facilities, in conjunction with other Phase A tasks.

Approach

Testing Period

Previously conducted bench-scale testing and Rio Grande water quality data indicate that the worst-case water quality (requiring the highest dose of treatment chemicals) occurs during the spring run-off period and on into the monsoon season, and a second period of concern is the low flow period in the fall. Previous reports have shown that the plant will be subject to large variations in temperature, TOC, alkalinity, solids (turbidity), and pH. Additionally, the river has extreme flow variations. The historical streamflow and water quality data from the USGS Otowi Gaging Station (Otowi) was reviewed to determine the optimum periods for pilot testing to collect data that will define the extremes in water quality and thus treatment requirements variability. Historical streamflow data shows the gradual peaking of streamflow in the spring between March and June. Water quality data collected from Otowi also shows that TOC typically increases during this period and the temperature is still lower. Otowi data shows TOC historically is above the median between April and September. Turbidity is lower during this period since most of the flow is a result of snow-pack runoff and not monsoon rains. Turbidity (and solids) data show a trend of increasing in July and August (the monsoon season). August is historically when there are numerous short term increases (300 to 500 cfs) in the streamflow as a result of rain. Since the turbidity data is not real-time, like the streamflow data, a correlation between turbidity and monsoon flow cannot be documented but is likely. Data trends show that flow, TOC, temperature and turbidity all drop during the fall (typically October) once the monsoon and irrigation seasons are over. There are no extreme variations in streamflow or water quality between the late fall and early spring - only temperature is shown to be at its lowest extreme.

Initiating the pilot test in April and operating the pilot equipment for six months will allow for sufficient data collection during the cold snow pack run off season. This season was the one requiring the highest chemical doses during bench-scale testing. TOC is increasing while the temperature is still low and this is believed to represent the worst-case period. This six-month period will include testing during the month of August which will provide treatment data in response to wide fluctuations in water quality caused by the monsoon. TOC can still be high in this period and temperatures are near their maximums. The yearly low flow is historically seen in the month of October and the six month testing period would end mid-October. The water quality characteristics are stabilizing while the temperature is beginning to decrease. Testing in this period will provide data for the late fall and early winter conditions without delaying the project schedule. Because the water quality does not significantly change after October, limited additional information would be obtained from testing later into the year or following year. The targeted test period (April to mid-October) is consistent with the patterns of the two previous years and the historic data. The previously completed Water Quality Studies and Evaluation Project included testing in May, August and October, dates within the proposed pilot testing periods.

Testing Location and Equipment

OC's mobile trailer mounted pilot test equipment will be utilized to conduct the testing within the fenced limits of Buckman Well No. 1. Three-phase power is available at Well No. 1 and the well is operated only periodically, which should ensure adequate power for the equipment. The mobile trailer consists of a 26-foot trailer with HVAC, hard piped source and drain lines, lighting and electrical hardware, desk/lab area, refrigerator, and a full 5-gpm process train that includes the following equipment:

- Influent module
- Ozone module
- Rapid mix/flocculation module
- Sedimentation module (tube settlers)
- Four filter columns (low pressure)
- Backwash module
- Chemical feed pumps
- Laptop computer for data collection and analysis
- Instrumentation to collect various water quality parameters including pH, temperature, turbidity, and particle counters
- Laboratory supplies including bottles, glassware, and analytical instruments
- Safety equipment such as goggles, gloves, fire extinguisher, and eye wash station

The equipment is set up with chemical feed ports in multiple locations to allow dosing at the influent, rapid mix and filter influent. The plumbing of the individual components allows for testing of ozone application at multiple locations, testing various backwash and air scouring rates and times and application of filter aid polymers at different concentrations in each filter column. The use of four separate filter columns allows direct comparison of different filter media configurations.

Raw water will be obtained from the river with the use of a submersible pump mounted onto a submerged platform and 1- to 1.5-inch pipe to convey the water to the pilot plant. The pipe will be installed on the ground surface, little trenching and only minimal land disturbance will occur. The pipe and conduit along the river bank will be buried, possibly within a larger carrier pipe, to minimize the potential for vandalism. A temporary use permit must be acquired from the United States Forest Service (USFS) before the pilot testing can begin. According to the USFS, the piloting work likely falls under a categorical exclusion not requiring an Environmental Assessment. A letter request was submitted to the USFS in December 2004 and it is believed the permit can be acquired prior to April 2005. Treated water will be discharged to a 20-ft by 20-ft square diked area within the fenced area where it will infiltrate. Per the Surface Water Quality Bureau, a permit is not necessary if the water does not flow off-site and reach the river. OC will construct the diked area and regrade the area once the pilot testing is completed. The discharged water will be properly dechlorinated when chlorine-based disinfectants are being used in the testing. Delivery of the equipment may be difficult due to the poor road conditions at the base of the hill up to Buckman Well No. 1. The City or County may have to assist delivery by placing gravel on this short section of Buckman Road prior to the equipment delivery and demobilization.

Two, 100-gallon polyethylene tanks will be used in combination with testing of the MIEX process. One tank will collect the brine waste. The other tank will be used for pumping the MIEX effluent into the pilot plant influent module with a 5-gpm pump.

Parameters and Tests

The water quality and operational goals proposed for the pilot study are summarized in Table 1.

Table 1. BDD WTP Pilot Plant Study Water Quality and Operational Goals

| Parameter | Minimum Requirement | Study Goal* |
|--|-------------------------------|--------------------|
| Filtered Water Turbidity | 0.30 NTU | 0.10 NTU |
| Settled Water Turbidity | 5.0 NTU | <4.0 NTU |
| TOC Removal | Varies per raw TOC/alkalinity | 50 percent |
| Total Trihalomethanes (THMs) – 3 day SDS | 80 µg/l | 60 µg/l |
| Total Haloacetic Acids (HAAs) – 3 day SDS | 60 µg/l | 40 µg/l |
| Ripening Time (Time to 0.1 NTU) | <2 hours | <30 minutes |
| Maximum Turbidity Spike (individual filters) | 1.0 NTU | 0.30 NTU |
| Filtration Rates | 3 to 6 gpm/sf | 8 to 10 gpm/sf |
| Filter Run Length | > 14 hours | >14 hours |
| Unit Filter Backwash Volume (UBWV) | <150 gal/sf | <150 gal/sf |
| Unit Filter Run Volume (UFRV) | >5,000 gal/sf | >5,000 gal/sf |
| Unit Ripening Time Volume (URTV) | <300 gal/sf | <200 gal/sf |
| Filter Efficiency | >90 percent | >95 percent |

* Study goals are preliminary and may be revised through discussions with the Owner based on additional information developed as part of this project.

The pilot study results will be evaluated by the ability to meet or exceed the minimum requirements. These minimum requirements were generally based on current regulations or levels of treatment achieved at similar plants. However, the Owner should strive to achieve the study goals to meet anticipated regulations, additional health concerns, and to provide a robust process in meeting periodic raw water extremes.

The quality and characteristics of the water source will fluctuate greatly during the year. Specifically, the *Water Quality Studies and Evaluation Report* outlined that the TOC removal requirement will range between 0 and 40 percent over the year. Other characteristics such as temperature, turbidity, and TDS also vary greatly, impacting treatment requirements. The pilot testing will evaluate the treatment requirements to comply with all current and anticipated proposed regulations considering the wide variation in raw water quality.

Previous testing indicates TOC removal requirements will control the chemical coagulant doses if enhanced coagulation is utilized to remove TOC. Turbidity removal is important but testing by EE&T (September 2004 and January 2005 reports) showed that chemical doses are higher to meet TOC than turbidity requirements with enhanced coagulation. Very high chemical doses were required in EE&T’s enhanced coagulation test and the evaluation of other TOC removal technologies is recommended to fully assess the most cost-effective technologies. Two technologies for TOC removal that will be pilot tested include MIEX (an ion exchange technology) and granular activated carbon (GAC). MIEX will be tested by renting a small, 5-gpm trailer-enclosed MIEX contactor. GAC will be used within the filters. These two technologies and enhanced coagulation will be pilot tested separately to assess and compare their effectiveness.

During testing periods, raw water will be continuously pumped to the pilot plant for testing and analysis. On-line sampling of TOC, pH, turbidity, and temperature will be continuously monitored and recorded for analysis.

OC will complete verification bench-scale testing at the onset of the pilot-testing. The bench-scale testing will allow the chemical doses to be fairly optimized and thus reduce the length of the chemical coagulant optimization period. The bench-scale testing will be completed using the Canyon Road WTP facilities during early April. The portable TOC analyzer and other analytical tools supplied with the pilot equipment will be used during the bench-scale studies to assess the test results. It is anticipated that two days of bench-scale testing will be completed. Bench-scale testing of the raw water for treatment with MIEX will also be performed by the Orica Watercare /WesTech prior to pilot testing to determine MIEX resin dose, coagulation dose, combined MIEX resin and coagulant dose. Orica Watercare /WesTech will also conduct simulated distribution system (SDS) testing on each of the optimized bench-scale tests by analyzing for DOC, THMs and HAAs. Completing the bench-scale testing will reduce the time required for pilot testing of the MIEX and allow for confirmation of the bench-scale results through pilot testing.

The pilot testing will involve numerous tests and the specific criteria identified in Table 1 will be utilized to review the effectiveness of the tested treatment scheme:

- **Raw and Finished Water Testing** Raw and finished water samples will be taken and sent to laboratories for analysis of all primary and secondary water quality standards every four weeks, or on a schedule agreed upon with the Owner, during the testing periods and following significant storm events and high turbidity episodes. A maximum of 16 total samples will be collected.
- **Coagulant Dose Optimization for Turbidity Removal** The coagulant chemical doses of aluminum sulfate (alum), ferric chloride (ferric) and polyaluminum chloride (PACl) will be tested to select doses of each that result in a low filtered water turbidity (<0.1 NTU) and settled water turbidity (<2 NTU), good and fast floc formation, effective sedimentation, unit filter run volumes (UFRVs) of 10,000 gal/sf or greater and positive visual observations. The initial optimizations will be completed with bench-scale tests and then refined by pilot testing. The doses will be adjusted and refined during each testing period.
- **Coagulant Dose Optimization for TOC Removal** The coagulant chemical doses of alum, ferric and PACl will be tested to select doses of each that result in an optimized TOC reduction, lower filtered water and settled water turbidity, good and fast floc formation, effective sedimentation, and positive visual observations. Sulfuric acid will be added to adjust the pH as needed. The initial optimizations will be completed with bench-scale tests and then refined by pilot testing. The doses will be adjusted and refined during each testing period.
- **Ozone Demand and Decay Testing** Ozone demand and decay will be determined for both raw and settled water with and without the use of MIEX. The dose and residual will be measured at different locations within the ozone columns to determine the demand and decay rates for both the raw and settled waters. This information will be utilized for future testing and for preliminary design of the ozone system, if utilized at the BDD WTP.
- **Chemical Optimization** The doses of other water treatment chemicals including coagulant aid, flocculant aid and filter aid polymers and preoxidants (sodium permanganate, chlorine dioxide, hypochlorite, MIOX, and ozone) will be evaluated to determine their effectiveness. The polymers typically assist in improving the finished water quality at lower doses of coagulant chemicals. The

filter aid polymers speed up the filter ripening times and increase UFRVs. The preoxidants oxidize dissolved constituents allowing their removal but some can lead to high concentrations of DBPs if fed at too high of concentrations. The initial testing will be based upon operating conditions only. DBP testing will be completed later in the testing.

- **Filtration Media and Rates** Use of four filter columns with the pilot plant will allow for side-by-side comparison of different media configurations, types and rates. Various depths of anthracite, sand, coarse sand, and GAC will be installed within the filters. Additionally, the filters can be operated at varying filtration rates. The finished water turbidity, filter ripening time, and UFRV will be compared to assess the most effective media configuration and filtration rates.
- **MIEX Efficiency for TOC Removal and Coagulant Dose Reduction** Manufacturer data indicates MIEX can reduce TOC and then subsequently reduce necessary coagulant doses. Chemical coagulant doses will be optimized in tandem with the MIEX operation. Settled water and filtered water TOC, low filtered water turbidity (<0.1 NTU) and settled water turbidity (<2 NTU), good and fast floc formation, effective sedimentation, unit filter run volumes (UFRVs) of 10,000 gal/sf or greater and positive visual observations will all be used to assess the test results. The bench-scale testing (discussed above) will be verified through the pilot testing.
- **GAC Removal Efficiency and Regeneration Requirements** The removal of TOC through GAC filters will be assessed by calculating the mass of TOC added to the filters and removed by the filters by monitoring the settled water and filtered water TOC. As the filtered water TOC increases during a test run, the GAC bed will be deemed exhausted. A small amount of GAC will be used in order to have the bed exhaust in one test run. Several test runs will be completed to verify results. Alternatively, Rapid Small Scale Column Tests could be completed to collect the data.
- **Disinfection and SDS Testing** SDS testing will be completed for various combinations of preoxidants and disinfectants or combined disinfectants to determine disinfection requirements and resultant DBP formation. Demand and decay testing will be completed (other than ozone which will be tested separately). Additionally, finished water will be collected and samples will be sent for laboratory analysis for ultraviolet light transmittance characteristics for determination of UV system preliminary design criteria. As part of this testing, a comparison will be made between MIOX and sodium hypochlorite. The comparison will look at doses and disinfection by-products. OC will subcontract this work to allow for rapid analytical results and certified incubation and testing methods to be employed.
- **Corrosion Indexing and Coupon Testing** Based on the treated water provided through the pilot plant facility, the Corrosion Index (utilizing RTW model) will be determined for comparison with other distribution system waters. Corrosion Coupon Testing will be performed under OC’s direction by the University of Washington on samples collected by OC and sent to the University weekly. Corrosion coupon testing will be conducted on: treated Rio Grande water and a blend of treated Rio Grande water with treated water from the Canyon Road WTP; a blend of treated Rio Grande water with Buckman well water; treated water from the Canyon Road WTP only; and Buckman well water only; and a blend of Canyon Road WTP and Buckman well water. A total of six different water qualities will be evaluated at three pH values, based on source water pH levels, necessary chemical addition and calcium carbonate saturation. The tests will involve exposing copper and lead-tin solder coated coupons for 6-8 weeks, with weekly water exchange and chemical measurements.

- **Presedimentation and Solid Study** Samples of raw river water will be taken and analyzed by both OC, laboratories, and outside equipment manufacturers to develop treatment criteria. Visual observation of solids generation and characteristics (depth, floc size and formation speed, density) will be recorded and compared during each test. Samples of settled sludge will be sent to outside equipment manufacturers for recommendations and design criteria for solids handling facility design.
- **Contaminant Testing** Additional sampling and laboratory testing will be conducted during four periods, with at least two of these after storm events, for the following contaminants:
 - Plutonium-238
 - Perchlorate
 - Tritium
 - Strontium-90
 - Cesium-137
 - Americium-241

The criteria outlined in Table 1 will be used to evaluate and compare test effectiveness to continually optimize the successful test parameters. The results of the pilot testing will be presented in a memorandum accompanied by laboratory data submitted shortly after the conclusion of the testing. A draft and final report will be prepared that summarizes the results of the entire testing effort.

Many other processes and technologies may be appropriate for effectively treating Rio Grande water. OC will collect raw water samples and send to various equipment manufacturers for small scale testing. Technologies may include various membranes and ballasted flocculation. Sludge from the sedimentation unit will be collected and sent to sludge dewatering equipment manufacturers. Each manufacturer will prepare a report outlining the testing data and design and operating recommendations. A maximum of eight samples will be sent to equipment manufacturers. OC will utilize the data and recommendations in determining the feasibility for the various technologies.

Personnel and Meetings

An OC engineer/technician will be on site each day of the testing period, excluding weekends, to operate and maintain testing equipment, prepare and dose chemicals, collect water quality data, observe test operation and collect test data, and collect samples for laboratory analysis. An OC field technician will be available to assist in collecting water samples for laboratory analyses and corrosion coupon testing. The Project Engineer will assist and oversee the OC engineer/technician during bench-scale testing and approximately one day per week throughout the six months of pilot testing. The Project Engineer and Senior Engineer will both be available to assist the OC engineer/technician with troubleshooting or assessment of test results via telephone or email as needed during the pilot testing. The Senior Engineer will be available on site up to 8 days for testing assistance or meetings and workshops. The project manager, project engineer and engineer/technician will attend all meetings. During operational periods of the pilot-plant, OC personnel will be on-call to test during significant storm events and high turbidity episodes. The OC engineer/technician will track storm events using LANL rain gauges and Otowi data, data from both is updated online every 15 minutes. Some significant storm events will be very obvious, especially if it occurs when the OC engineer/technician is at Buckman Well No. 1. Notification from Santa Fe water division O&M staff out in the well field will also be helpful in alerting the OC engineer/technician of rain in the area of the piloting equipment.

Eight workshops will be held during the piloting task. One workshop will be conducted after submittal of the testing plan. One workshop per month (6 total) will be held each month to discuss the progress and findings of the piloting. One workshop will be held after the draft pilot test memoranda are prepared and submitted. The scope also includes an additional four meetings or workshops that will be held as needed.

In addition to the meetings, a technical review meeting will be held with the Owner to review and discuss the draft Pilot Study Report. The meeting will be attended by OC’s project manager, project engineer, senior water quality engineer, pilot plant technician, and a project-independent senior water quality engineer. The Owner will provide representatives that may include outside consultants. Material will be distributed prior to the meeting by OC. OC will then present material at the review session and facilitate discussions. The technical review committee members will develop review comments which OC will provide a response to after the review meeting. A meeting will be held with the Owner to discuss the responses and provide direction prior to OC finalizing the pilot study report.

Water Quality Monitoring

The water will be monitored for temperature, turbidity, pH, and TOC with online instrumentation. Two online TOC analyzers will be installed within the pilot plant to collect continuous real-time TOC data during testing. These instruments, manufactured by Ionics, will be appropriate for long-term TOC monitoring at the Buckman Direct Diversion facility and will be turned over to the Owner for use at the MRC WTP. The use of two instruments is necessary to monitor any changes in the TOC in the raw and filtered water at the pilot plant. One on-line TOC instrument will be installed to monitor the raw water. This instrument will also be utilized to analyze grab samples (such as settled water and DOC). A portable, on-line TOC instrument equipped with an auto-sampler will be utilized to continually monitor the effluent from the four filter columns. TOC samples will be collected and filtered through a 0.45 micron filter and analyzed to determine DOC in the raw, settled and filtered water at least once per test. The portable instrument will be used to measure TOC during the bench-scale testing also. Turbidity, pH and temperature will be measured continually in the raw water, settled water and in the effluent of all four filters. All on-line instruments will record data into the pilot plant computer system.

Six monthly samples and one additional sample (seven samples total) will be collected for *Cryptosporidium*/*Giardia* analysis. Samples were previously collected from August to January for the *Water Quality Studies and Evaluation Report* in order to predict the Bin Classification and resulting additional *Cryptosporidium* removal requirements. *Cryptosporidium* was not detected in those samples which could indicate that no additional removal is required. However, an additional 1-log removal of *Cryptosporidium* was recommended for system flexibility. The additional six samples will confirm the previous results and will complete the collection of data for most months of the year. The seventh sample will be collected during a rain event in the month of August while the pilot testing is ongoing. One previous sample was collected during a rainfall event and a second sample will be useful in assessing the *Cryptosporidium* potential during seasonal rainfall. It should be noted that even with the additional data, no data for February or March will be available. Previous *Cryptosporidium*/*Giardia* analysis indicated that the high sediment content in the Rio Grande will require additional laboratory processing of the samples to meet the minimum analysis requirements under the EPA method. This additional processing is significantly more expensive than previous tests and this scope of work assumes the maximum processing (additional filters and pellet processing) is needed. Only one of the previous *Cryptosporidium*/*Giardia* analyses met the minimum processing requirements.

Raw and finished water quality will be assessed during the entire six month pilot testing period. All primary and secondary contaminants, with a few exceptions explained below, will be collected for laboratory analysis. The frequency of raw and finished water sampling will be presented and agreed upon with the Owner prior to initiating pilot testing. Additionally, two sets of samples will be collected during rainfall periods. A total of 16 sets of samples will be collected and analyzed. No analysis of disinfection by-products or disinfectants will be conducted as these tests are unnecessary in raw water. Although listed as primary standards, *Cryptosporidium*/*Giardia* analyses will not be conducted at the frequency discussed above and not every two weeks. Pinnacle Laboratories will be laboratory responsible for providing the sampling kits and arranging for all testing at their lab or a subcontractor’s lab. Pinnacle has indicated that the test method for asbestos proves difficult in waters with high sediment concentrations and therefore, testing for asbestos may not be possible. Including asbestos, a total of 93 primary and secondary contaminants will be analyzed and reported. The organic fractions in the TOC determine the ease or difficulty in removing the TOC and the effectiveness of various TOC removal technologies. Three raw water samples will be collected and sent to the University of Washington for fractionation with resins to distinguish between hydrophobic and hydrophilic fractions and correlate to reactivity and DBP production. Raw water will also be tested for the contaminants that the Concerned Citizens for Nuclear Safety believe could enter the river from Los Alamos as discussed in the Parameters and Tests subsection above.

Some constituents will be collected for laboratory analysis more frequently than discussed above for the raw and finished water. Although TOC will be analyzed with on-line instrumentation, two verification samples per week (one per instrument) will be collected. Alkalinity, DOC, total suspended solids, total dissolved solids and turbidity will also be measured in the raw water every week for data needs and instrument verification. The maximum number of analyses will be as follows: TOC (52), DOC (26), alkalinity (26), total suspended solids (26), total dissolved solids (26) and turbidity (26). Up to eight samples per month will be analyzed for iron and manganese in the treated water, a maximum of 48 samples for each, to determine residual concentrations from the addition of iron coagulants and permanganate treatment chemicals. UV254 will be measured (1 raw and 6 treated per week - 182 total) to assess the make-up of TOC and general UV treatment requirements. Additional water quality data (raw, settled and filtered) will be collected throughout the testing using laboratory or field instruments and may include color, chlorine residual, UV254, alkalinity, iron, manganese, turbidity, pH and conductivity.

Assumptions

- OC will provide mobile pilot testing equipment, submersible pump, pipe, electrical conduit and wiring
- City will assist OC in connecting electrical equipment at Well No. 1
- OC will complete two days of bench-scale testing prior to the first round of pilot testing to verify previous results and define chemical doses for further testing
- Bench-scale testing will be conducted at the Canyon Road WTP laboratory
- A Temporary Use Permit from the US Forest Service is required and will be obtained in a timely manner

- The City will provide sufficient access to Well No. 1 for the mobile equipment and OC staff, including keys to gates and placement of gravel at bottom of hill below Well No. 1 on Buckman Road prior to mobilization and demobilization
- OC will purchase two Ionics TOC analyzers - the instruments will be stored until the Design/Builder utilizes them at the MRC WTP
- OC will rent 5-gpm MIEX pilot unit for two month period during first three months of testing
- OC can dispose of the brine waste (approximately 75 gallons per week) from the MIEX pilot unit within the sludge lagoons at the Canyon Road WTP at no cost
- City will provide electricity at Buckman Well No. 1 to power equipment
- OC will rent a port-a-potty unit for placement at Well No. 1 for the duration of the piloting task.
- OC will obtain necessary services to excavation the discharge pit at Well No. 1
- OC will construct a 20-ft square diked area within Well No. 1 fenced limits to allow the treated water to infiltrate into the ground. OC will also regrade the area once the pilot program is completed.
- A discharge permit will not be required. The discharged water will be dechlorinated by OC.
- One continuous testing period will be completed and the approximately pilot testing dates are April 15 to October 15
- OC will collect *Cryptosporidium*/*Giardia* samples from the diversion location monthly from April to October and one additional sample during a rain event (7 samples total) and submit to CH Diagnostics and Consulting Services for laboratory analysis
- Raw and finished water will be sampled for all primary and secondary drinking water standards at a frequency agreed to with the Owner and two more samples will be collected during major rain events. A total of 16 samples will be collected for laboratory analysis. These samples will not be analyzed for disinfectants or disinfection byproducts. *Cryptosporidium*/*Giardia* (7 samples total) will be collected as discussed above.
- Four samples total, including two during a major storm event, will be collected from the Rio Grande and analyzed for plutonium-238, perchlorate, tritium, strontium-90, cesium-137 and americium-241
- Additional sampling and laboratory and field analysis will be conducted to verify instrumentation accuracy and raw, settled and finished water quality as detailed in the monitoring subsection of the approach description
- Up to 12 pilot testing memoranda will be prepared and will discuss the following subjects: raw water testing; coagulant dose optimization for turbidity removal; coagulant dose optimization for TOC removal; ozone demand and decay testing; chemical optimization; filtration media and rates; MIEX efficiency for TOC removal and coagulant dose reduction; GAC removal efficiency and

regeneration requirements; disinfection and SDS testing; corrosion indexing and coupon testing; presedimentation and solids; and contaminant testing.

- OC will hold one workshop after submittal of the draft pilot testing plan, one workshop per month during the testing period, and one final workshop after preparation of the draft report for a total of eight workshops
- Four additional meetings or workshops will be held as necessary.
- Raw water samples will be sent to MIEX, membrane, ballasted flocculation, and other process equipment manufacturers to determine feasibility of each technology which will then be reviewed and presented to the Owner. Water will be sent to a maximum of eight manufacturers, based on selection of manufacturers with the Owner.
- Sediment from sedimentation basin will be sent to sludge dewatering equipment manufacturers to determine treatment costs and select feasible technologies for sludge reduction
- The City’s daily security visits of the Buckman facilities will include the pilot facilities
- The pilot testing report will include results of all testing, process recommendations, residuals treatment recommendations, water regulation compliance issues, evaluation of process to meeting existing and anticipated future requirements, and treatment benchmarking, among other items. Operation and maintenance costs will be prepared under the Phase B preliminary design task, should it be determined that the OC is to proceed with this work.
- Any Owner staff or their representatives are welcome to visit and witness pilot testing.
- The Owner will obtain necessary approvals from the OSE/ISC to divert water for the pilot testing.
- OSE permit for obtaining water from Rio Grande will be obtained in time for the mid-April pilot testing.

Deliverables

- Testing plan explaining testing to be conducted, testing procedures, reasoning and ramifications of possible results
- 12 draft memoranda laboratory results and draft testing summary. The deliverables will be titled as follows:
 - Summary of Pilot Testing Report
 - Raw Water Testing Results Memorandum
 - Coagulant Dose Optimization for Turbidity Removal Memorandum
 - Coagulant Dose Optimization for TOC Removal Memorandum
 - Ozone Demand and Decay Testing Memorandum
 - Chemical Optimization Memorandum

- Filtration Media and Rates Memorandum
- MIEX Efficiency for TOC Removal and Coagulant Dose Reduction Memorandum
- GAC Removal Efficiency and Regeneration Requirements Memorandum
- Disinfection and SDS Testing Memorandum
- Corrosion Indexing and Coupon Testing Memorandum
- Presedimentation and Solids Memorandum
- Contaminant Testing Results Memorandum
- Minutes from 12 workshop sessions and meetings
- Copies of equipment manufacturers recommendations
- Final report and memoranda

Additional Services

In addition to the Basic Services required to carry out Phase A of the Project, there may be a need for Additional Services that cannot be fully described or quantified at the commencement of work under this Agreement, due to inadequate information or the need for details yet to be developed. Additional Services that the Owner and the OC have identified that may be required during Phase A are generally described below. Prior to commencing work on any of these tasks, the OC and Owner will complete the procedures of Exhibit C for authorization of any Additional Services work.

Task AA1 – Legislative and Funding Assistance

Provide ongoing coordination and support for the Owner’s pursuit and administration of federal funds. OC will provide federal legislative, policy and appropriations support for the Buckman Direct Diversion Project and interrelated water supply infrastructure needs. Advocacy for grant and cost-shared funding for pre-construction elements of the Project will continue and will transition to construction funding as the project progresses. Comprehensive federal funding assistance for construction of the Buckman Direct Diversion will likely require drafting, lobbying for, and enactment of new or amended federal agency (principally U.S. Bureau of Reclamation [USBR]) authority.

Task AA2 – Bonding Support

Provide assistance to the Owner with regard to engineering inputs to the process of issuing revenue or general obligation bonds to raise funds for the local costs of the project. The OC will likely prepare an “independent” (not a direct employee of the City or County) engineer's report for inclusion in the bond offering statement and attend up to two meetings with the financial advisor and other members of the city's financing team to review progress of the independent engineer's report and other activities in the bond issuance process. OC may also attend and

participate in planning meetings and presentations to bond rating agencies located in New York City.

Task AA3 – Existing Transmission and Distribution System Modeling

After an evaluation of available modeling for the City’s and County’s distribution systems under Subtask A10.1, OC will perform modeling of the systems(s) to determine where finished water connections are to be made and certain hydraulic criteria. This item is an additional service since the need or extent of modeling can not be determined in advance.

Task AA4 – Additional Tests and Investigations

Tests and investigations as part of Task 10 by the OC that are determined by the Owner to be necessary to reduce uncertainty in the preparation of the preliminary design and/or proposals by DB proposers and which are not included in the Phase A basic services.

Task AA5 – Additional Services Requested by Owner

Additional services, those not included in the basic Phase A services, will be provided by the OC as requested by the Owner. These additional services may include additional meetings, evaluations, technical memoranda and other directly related work that is not included in the Basic Services but which the Owner and the OC recognize, during the performance of this agreement, is required.

Task A11 – Prepare Step One Request for Proposals (RFP)

Objective

OC will prepare the initial procurement document to initiate a competitive proposal process under the City's procurement rules for DB projects. The Step One RFP will also take into account the City's objectives and criteria and the Project Delivery Strategy developed in Phase A as well as prevailing standards and best practices in the municipal water DB industry.

Approach

A detailed outline of the Step One RFP will be prepared by CDM and reviewed with the City. Upon the completion of the review, an entire Step One RFP document will be prepared by CDM and submitted to the City for review and comment. The contents of the document will include (as a minimum) the requirements outlined in Section 23.B.4.2 of the City Purchasing Manual. The RFP will be prepared to be in conformance with the City of Santa Fe Purchasing Manual, including all the requirements of Section 23.B for Design-Build Projects. The Step One RFP will be brief but at the same time detailed enough to ensure that all relevant information is requested and all evaluation criteria are sufficiently defined.

A preliminary listing of the major sections of the Step One RFP includes:

- Introduction
- Project Description
- Procurement Process and Schedule
- Submittal Instructions and Requirements
- Evaluation Criteria and Selection Process

Key evaluation criteria for the Step One proposals will include financial condition (including bonding and insurance capacity), relevant project experience, previous contract and references, competence and capabilities of firms and key personnel, past performance, DB organization and management, and approach to project delivery (including risk allocation). Minimum criteria will be recommended by CDM for financial condition and project experience.

CDM's financial advisory subcontractor will review and provide input to the draft Step One RFP.

The Step One RFP will be reviewed in detail by CDM with the City. Upon the completion of such review and receipt of comments, the final "for-issuance" Step One RFP will be prepared.

A methodology (draft and final) that incorporates the evaluation process and criteria set forth in the Step One RFP will be prepared by CDM for the City's Evaluation Committee's application in evaluating the responsive Step One submittals. The CDM

methodology will include two basic components: (1) responsiveness review, and (2) rating of comparative evaluation criteria. The final methodology will be prepared by CDM upon completion of the City's review and comment on the draft methodology. In preparing this methodology, alternative approaches will be presented by CDM and discussed with the City, including different methods of aggregating the scores of individual members of the Evaluation Committee and different numerical and non-numerical rating systems.

Assumptions

- Up to two meetings with the City to review contents of Step One RFP and evaluation methodology

Deliverables

- Detailed outline of Step One RFP
- Evaluation methodology
- Draft Step One RFP document
- Final "for issuance" Step One RFP document

Task A12—Funding Assistance

Engineer, in conjunction with its subcontractor The Ferguson Group, will provide ongoing coordination and support for the Owner's pursuit and administration of federal funds on an as-needed, time and materials basis for the period specified herein. Engineer will provide federal legislative, policy and/or appropriations support for the Buckman Direct Diversion Project and interrelated water supply infrastructure needs. The Engineer and The Ferguson Group will continue their previous work provided under a previous agreement to assist the City to advocate for grant and cost-shared funding for pre-construction elements of the Project. The focus of the advocacy will transition to construction funding as the project progresses. Comprehensive federal funding assistance for construction of the Project is anticipated to require drafting, lobbying for, and enactment of new or amended federal agency (principally U.S. Bureau of Reclamation [USBR]) authority.

Engineer will work with the Owner and the Santa Fe Congressional Delegation in requesting federal appropriations, legislation (as needed), and federal agency and regulatory assistance relative to the San Juan-Chama Project and contracts (as needed).

Assumptions:

- Services will be provided in coordination with those services provided separately by the Owner's state lobbyist firm

- This current authorization is part of an ongoing legislative and appropriations effort. An estimated cost over a projected time period has been provided based on historical levels of effort for similar as-needed legislative and appropriations support services.
- This current authorization provides for continuing support for federal legislative and appropriations efforts. The Engineer will provide these additional services as requested by the Director, Sangre de Cristo Water Division until the authorized funds are exhausted or until the expiration of the Engineering Services Agreement, whichever occurs first.

Deliverables:

- Completion of tasks and support work as recommended by the Engineer and authorized by the Director of the Sangre de Cristo Water Division
- Coordination with Owner's state lobbying firm
- Additional deliverables as determined by the Owner for this additional services task

Task A13— Geotechnical Study and Corrosion Control Field Work

Objective

Through this geotechnical study, the OC will determine appropriate criteria for foundation design, roadway design, trenching, backfill and compaction, and other geotechnical related design recommendations to minimize both uncertainty during design of the facilities and DB change orders resulting from unexpected site conditions. The OC will develop corrosion control for the OC's preliminary design, as well as the project criteria/constraints and procurement document development, design and construction. The OC's geotechnical investigation will be completed in tandem with the corrosion control study that will provide for corrosion protection commensurate with the required facility service life and operational importance. It will establish the necessary corrosion control design criteria and allow the OC to minimize the total life cycle cost of the various facilities under the preliminary design task.

Approach

The OC's approach will provide a reasonable level of geotechnical design data for all portions of the Project which authorization for disturbance can easily be obtained prior to issuance of the ROD. The OC's study will include a literature search, geologic mapping of the study area, field exploration and compilation of a comprehensive report with specific design criteria and recommendations.

A Temporary Use Authorization (TUA) from the Bureau of Land Management (BLM) and United States Forest Service (USFS) is necessary before the geotechnical exploration work can be performed. As part of this scope of work, the OC will prepare draft and final letters to the BLM and USFS, mapping, and a SF-299 form requesting a TUA. The Owners will be responsible for obtaining necessary signatures, completing and delivering the letters to the two agencies.

Available geotechnical reports prepared for facilities in the study area will be reviewed by the OC. Existing reports which will be reviewed include the Caja del Rio Landfill, existing Buckman Booster Station 2 and supplemental well investigation, Caja del Rio Road, NM 599, and reports for the Las Campanas area. Data from the Soil Conservation Service and available geologic maps of the alignment will also be reviewed. The study area will be geologically mapped by the OC. Particular attention will be given to the lateral extent of the basalt flows which could limit the construction of buried facilities at the proposed City/County WTP site, as occurred at the adjacent Caja del Rio Solid Waste Facility. Mapping will be performed using either aerial photographs or USGS Quadrangle maps as a base.

The OC's field exploration will consist of a series of test holes and backhoe pits excavated along the pipeline alignment and for the major facilities. Test holes are necessary to collect subsurface soil samples for characterization and testing for engineering properties at large or buried facilities. Test holes will be drilled with a truck-mounted auger drill rig. Final locations of the facilities at the water

treatment plant are not known; therefore, test holes will be drilled on a grid pattern. Test holes will be located to identify the presence and depth to basalt at the water treatment plant site. It is anticipated that a total of 25 test holes, to a depth of 45 feet or refusal, will be drilled. Three additional test holes will be drilled: one near the diversion and low head pump station and two at the preferred alternative location for the Sediment Removal Facility and Booster Station 1A.

Pipeline backhoe pits will be excavated by the OC along the proposed pipeline alignment between Booster Station 1A and the water treatment plant site. Pipeline backhoe pits are considered preferable to test holes, because they provide specific information on excavation conditions of the soil. Pipeline backhoe pits will be completed using a backhoe with an extended digging arm and a 24-inch bucket. It is anticipated that a total of 14 pipeline backhoe pits will be excavated to a total depth of ten feet.

Test holes and pipeline backhoe pits will be completed in the locations indicated on the mapping included with the TUA request letters to BLM and USFS. Refer to the request letters for additional information on the testing methods. All test holes and pipeline backhoe pits will be field logged by a qualified geologist. A laboratory testing program will be performed by the OC on undisturbed test hole samples and representative pipeline backhoe pit samples obtained during the field investigation. The laboratory testing program will be structured to provide all of the physical properties necessary for developing geotechnical recommendations. Laboratory testing will include: moisture content, dry density, sieve analysis, Atterberg limits, consolidation and pH. Engineering analysis will be performed to develop foundation design recommendations for the proposed facilities. All collected information and engineering analysis and recommendations will be compiled into a comprehensive report that will be included in the DB procurement and contractual documents.

It is assumed that the BLM and USFS will issue stipulations to the TUA. The OC anticipates a field trip to stake each test hole location and access location as needed, a second field trip with BLM and USFS to review the test hole locations and existing site conditions, and a third field trip at the conclusion of the testing to rake the soil and apply seed and mulch to the disturbed areas. A final field meeting with BLM will likely be required to review the condition of each test site. Blue Stake, a utility locator service, will be contacted to locate and mark all buried utilities near each proposed test site. In the event the Blue Stake does not mark buried water and electric service lines for the Buckman Wells, PNM and Santa Fe's City Water Division will be called to locate and mark the lines prior to excavation.

Additionally, the OC's geotechnical engineer will work with the corrosion control engineers (Corrpro) to complete time sensitive field measurements for resistivity and oxygen reduction potential.

The corrosion control evaluation will address the likelihood of corrosion deterioration and the consequences of corrosion failure. Working closely with other disciplines, corrosion control measures for metallic and concrete reinforced underground facilities, atmospherically exposed facilities, and submerged facilities will be established.

The existing Buckman pipeline is constructed of Ductile Iron and is more than 30 years old and in excellent condition. A corrosion study resulting in design recommendations was conducted by the Ductile Iron Pipe Research Association before construction of the Buckman pipeline. Even with the existing study and the operating history of the Buckman pipeline, the large investment in pipelines on this project makes it prudent to conduct a thorough corrosion study before design and construction of the new pipelines. Consistent with other aspects of procurement document development, a risk-based approach to determine corrosion control needs will be employed by the OC. The evaluation will address the likelihood of corrosion deterioration and the consequences of corrosion failure. Working closely with other disciplines, corrosion control measures for metallic and concrete reinforced underground facilities, atmospherically exposed facilities, and submerged facilities will be established by the OC. These measures may include specific materials of construction, protective coatings, paints or linings and cathodic protection.

First and foremost, a records review of earlier soil corrosivity evaluations (e.g. DIPRA, 1972, for existing Buckman Pipeline), and interviews with water operations and maintenance staff on leak history and other corrosion issues relating to existing nearby facilities will be conducted by the OC. The soil corrosivity will be determined using non-invasive resistivity techniques along the project ROWs and from the samples collected during the geotechnical study. Electrical measurements will also be collected to determine the possible influence of stray currents from other utilities and operation of nearby cathodic protection system on the pipeline. The collected data will be incorporated in a risk-based design decision computer model to develop appropriate corrosion control treatment(s) only where needed, rather than a conservative approach applied to the entire pipeline or all facilities. A Corrosion Control Engineering report will be prepared by the OC and will include general requirements for the project approach to corrosion control. Additional corrosion control engineering work will be completed during Phases B and D of the Project.

Assumptions

- Adequate, applicable data is available from other nearby sites
- BLM and the USFS will grant TUA by October 28, 2005
- Access to all proposed facility locations and pipeline alignments is available
- Study areas accessible to a truck-mounted drill rig and backhoe

- Twenty-eight borings and 14 pipeline backhoe pits will be completed on USFS and BLM managed lands
- Surveying, other than GPS locations, will not be necessary
- New Mexico One Call will locate and mark utilities
- PNM and the City Water Utility Division may be required to separately locate and mark buried Buckman facilities
- All 42 testing locations will be flagged for site identification for agency field trip, utility locates, and testing
- Up to 61 soil samples will be collected by the geotechnical engineer for laboratory analysis by the corrosion control engineer
- The non-invasive soil Corrosivity testing will be completed throughout the entire pipeline alignment except on private or state lands
- Seed mixture utilized for the City's Supplemental Buckman Wells 10-13 project will be approved by BLM and USFS for use
- Three field meetings with BLM and USFS will be necessary to review each site prior to disturbance (one meeting) and after reseeding to evaluate success of revegetation efforts (two meetings)

Deliverables

- Draft and final TUA letters for BLM and USFS with mapping
- Meeting minutes from three field trips
- Draft and final geotechnical study with design criteria and requirement recommendations
- Draft and final corrosion control engineering report